

--Claim 38. An apparatus for microscopic imaging comprising:

a light source, said light source producing light directed to or into a material to be imaged, said light being selected in frequency and energy to penetrate into or below a surface of the material and to promote two-photon excitation substantially only in a region to be imaged;

a modulator, said modulator cooperating with said light to modulate said light with a type of modulation and produce a modulated light; and

a detector positioned to receive and detect radiation emitted by a photo-activated molecular agent within the material after said agent has been excited using two-photon excitation.--

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--Claim 39. An apparatus according to Claim 38 further comprising a demodulator, said demodulator coupled to said detector and producing a demodulated energy signal which is characteristic of the particular photo-activated molecular agent.--

--Claim 40. An apparatus according to Claim 39 wherein said demodulator is a processor.--

--Claim 41. Apparatus for medical diagnostic imaging comprising:

a light source, said light source producing light directed to or into deep tissue to be imaged, said light being selected in frequency and energy to penetrate into or below a surface of the tissue and to promote two-photon excitation substantially only in a region to be imaged;

a focusing apparatus, said focusing apparatus being able to vary the position of the light within a range of depths in the region of tissue to be imaged;

a detector positioned to receive and detect radiation emitted by a photo-activated molecular agent within the material after said agent has been excited using two-photon excitation.--

--Claim 42. An apparatus according to Claim 41 wherein said light source produces near-infrared light.--

--Claim 43. An apparatus according to Claim 42 wherein said light source is a laser.--

DI --Claim 44. An apparatus according to Claim 41 further comprising a modulator, said modulator cooperating with said light to modulate said light with a type of modulation and produce a modulated light.--

--Claim 45. An apparatus according to Claim 44 further comprising a demodulator, said demodulator coupled to said detector and producing a demodulated energy signal which is characteristic of the particular photo-activated molecular agent.--

--Claim 46. An apparatus according to Claim 45 wherein said demodulator is a processor.--

--Claim 47. An apparatus according to Claim 41 wherein said light source produces a pulsed output having a pulse repetition frequency above about 75 megahertz and a subnanosecond pulse duration.--

--Claim 48. An apparatus according to Claim 41 wherein said light source produces pulse energies of about 20 nanojoules.--